

Multiple Deep Jupiter Atmospheric Probes Delivered By a Modified INSIDE Jupiter Spacecraft

Thomas R. Spilker, JPL/Caltech

The INSIDE Jupiter (IJ) spacecraft offers a low-cost implementation option for a multiple deep Jupiter probes mission. Trajectory designs already exist that allow a single carrier-relay spacecraft (CRSC) to deliver and support multiple atmospheric entry probes to different latitudes at Jupiter. Such trajectories, based on a CRSC polar flyby, do not require orbital insertion at Jupiter. This greatly reduces radiation exposure and propulsive requirements compared to an orbital mission, and simplifies operations. Recent design studies show that a derivative of the solar-powered INSIDE Jupiter spacecraft, modified for such a flyby trajectory and carrying probes, could serve as the CRSC, decreasing the CRSC's development costs. The simpler IJ-CRSC requirements allow large mass reductions in many of the IJ spacecraft's subsystems, notably removing the large primary propulsion system used for orbit insertion in the original IJ mission. For an IJ-CRSC mission, three probes and their deployment system take the place of that propulsion system. JPL's Advanced Projects Design Team produced the conceptual design for the fully instrumented entry probes (not "microprobes") that can reach ~100-bar levels. Although probe mass estimates vary from 75 to 110 kg depending on technologies assumed, the total mass of the IJ-CRSC spacecraft and probes would be at least 200 kg less than that of an orbital-mission IJ spacecraft. The full poster details the probes' science missions and data return, and non-proprietary engineering aspects.

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